SUPPLEMENTARY INFORMATION

Attitudes towards booster, testing and isolation, and their impact on COVID-19 response in winter 2022/2023 in France, Belgium, and Italy

Giulia de Meijere[1,2], Eugenio Valdano[3], Claudio Castellano[2,4], Marion Debin[3], Charly Kengne-Kuetche[3], Clément Turbelin[3], Harold Noël[5], Joshua S. Weitz[6,7,8], Daniela Paolotti[9], Lisa Hermans[10], Niel Hens[10,11], Vittoria Colizza[3*]

[1]*Gran Sasso Science Institute (GSSI), L'Aquila, Italy*
[2]*Istituto Sistemi Complessi (ISC-CNR), Roma, Italy*
[3]*Sorbonne Université, INSERM, Institut Pierre Louis d'Épidémiologie et de Santé Publique (IPLESP), Paris, France*
[4]*Centro Ricerche Enrico Fermi, Roma, Italy.*
[5]*Santé Publique France, Saint-Maurice, France*
[6]*School of Biological Sciences, Georgia Institute of Technology, Atlanta, GA, USA*
[7]*School of Physics, Georgia Institute of Technology, Atlanta, GA, USA*
[8]*Institut de Biologie, École Normale Supérieure, Paris, France*
[9]*Computational Epidemiology Laboratory, Institute for Scientific Interchange, Turin, Italy*
[10]*Data Science Institute, I-biostat, Hasselt University, Hasselt, Belgium*
[11]*Centre for Health Economics Research and Modelling Infectious Diseases (CHERMID), Vaccine and Infectious Disease Institute, University of Antwerp, Antwerp, Belgium*

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1. Survey on prospective adherence to vaccination, testing and isolation during the 2022-2023 winter.

a. Correspondence between educational levels across country datasets

The list of dataset labels that were used to inform the groups of level of education is provided in **Table S1** for the three countries.

Table S1. Correspondence of the groups of level of education (<=A-levels, >A-levels) across national datasets.

	Survey	Real population		
		France	Belgium	Italy
Source of dataset	**(SI)**	**(1)**	**(2)**	**(3)**
<=A-levels	"A-Levels or equivalent (e.g. Highers, NVQ Level3, BTEC)", "I have no formal qualifications", "GCSE's, O'levels, CSEs or equivalent"	"Aucun diplôme ou certificat d'études primaires", "BEPC, brevet des collèges, DNB", "CAP, BEP ou équivalent", "Baccalauréat, brevet professionnel ou équivalent"	"LOW", "MIDDLE", "UNK"	"analfabeta", "alfabeta privo di titolo di studio", "licenza di scuola elementare", "licenza di scuola media inferiore o di avviamento professionale", "diploma di istituto professionale", "diploma di scuola magistrale", "diploma di istituto d'arte ", "diploma di istituto tecnico", "diploma di istituto magistrale", "diploma di liceo

				(classico, scientifico, ecc.)"
>A-levels	"Bachelors Degree (BA, BSc) or equivalent (e.g. HND, NVQ Level 4)", "Higher Degree or equivalent (e.g. Masters Degree, PGCE, PhD, Medical Doctorate, Advanced Professional Awards)"	"Diplôme de l'enseignement supérieur de niveau bac + 2", "Diplôme de l'enseignement supérieur de niveau bac + 3 ou bac + 4", "Diplôme de l'enseignement supérieur de niveau bac + 5 ou plus"	"HIGH"	"diploma di accademia di belle arti etc. conservatorio vecchio ordinamento", "diploma universitario (2-3 anni) del vecchio ordinamento (incluse le scuole dirette e a fini speciali o parauniversitarie)", "diploma accademico A.F.A.M. I livello", "laurea triennale", "diploma accademico A.F.A.M. II livello", "laurea (4-6 anni) del vecchio ordinamento, laurea specialistica o magistrale a ciclo unico del nuovo ordinamento, laurea biennale specialistica (di II livello) del nuovo ordinamento", "dottorato di ricerca"

b. Survey text (English version)

GRIPPENET.FR SURVEY ON PROSPECTIVE TESTING AND ISOLATION FOR THE 2022/2023 WINTER

In the following, COVID-19 is used to refer to both the disease by the SARS-CoV-2 virus and the SARS-CoV-2 virus itself, for the sake of simplicity.

SECTION 1 – PRIOR INFECTION
Q1) Have you been infected with COVID-19 so far (infection confirmed by a positive PCR, an antigenic test or a home swab)? The number of times here below refers to different infection episodes, not to repeated positive tests during the same episode.
-never
-yes, once
-yes, twice
-yes, three times
-yes, four times or more
-I don't know / do not remember

SECTION 2 – VACCINATION AGAINST COVID-19
Q2) How many vaccine doses against COVID-19 did you receive so far?
-0
-1
-2
-3
-4 or more

Q3) When did you get your last dose? ([mm/yyyy])
[mm/yyyy]

Q4) If recommended next fall/winter (2022-23), will you vaccinate with an additional dose?
-yes
-no
-I don't know

SECTION 3 – PERCEPTION
Q5) To what extent do you agree or disagree with each of the following statements? Select only one for each row.
Statements (same answers):
-Coronavirus would be a serious illness for me
-I'm likely to catch coronavirus (again)
-I'm worried that I might spread coronavirus to someone who is vulnerable
-I'm concerned about the possible long-term impacts of COVID-19 for myself
-It is important that people in my community are vaccinated
Answers:
-Strongly agree
-Tend to agree

-Neither agree nor disagree
-Tend to disagree
-Strongly disagree
-I don’t know

SECTION 4 – ENVIRONMENT
Q6) Does any of your close contacts take regular medication for any of the following medical conditions? (Select all options that apply)
-No, none of my contacts takes regular medication for these diseases
-Asthma
-Diabetes
-Lung disorder (COPD, emphysema, ...)
-Heart disorder
-Kidney disorder
-An immunocompromising condition (e.g. splenectomy, organ transplant, acquired immune deficiency, cancer treatment)

SECTION 5 – ASYMPTOMATIC TESTING AGAINST COVID-19 (so-called ‘test de confort’)
Q7) In the period December 2021 – March 2022, how many times did you get tested, on average, for preventive reasons (e.g. to participate to a family event or before regular visits to family members, for your own comfort, to monitor if you were infected asymptomatic, etc.), and not because of symptoms or because you were a case contact?
-more than once per week
-once per week
-every two weeks
-once per month
-less than once per month
-never
-I don’t know

Q8) In the last month, how many times did you get tested for preventive reasons (e.g. to participate to a family event or before regular visits to family members, for your own comfort, to monitor if you were infected asymptomatic, etc.), and not because of symptoms or because you were a case contact?
- -
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- More than 20

SECTION 6 – TESTING AGAINST COVID-19 NEXT FALL/WINTER

Q9) In the next fall/winter and in case of a winter wave of COVID-19, how many times do you plan to get tested against COVID-19, on average, for preventive reasons (e.g. to participate to a family event or before regular visits to family members, for your own comfort, to monitor if you are infected asymptomatic, etc.), and not because of symptoms or because you are a case contact?
Imagine conditions for getting tested (e.g. access to the diagnostic tests, cost) are those of the past winter.

-more than once per week
-once per week
-every two weeks
-once per month
-less than once per month
-never
-I don't know

Q10) Depending on test cost, in the next fall/winter and in case of a winter wave of COVID-19, how many times do you plan to get tested against COVID-19, on average, for preventive reasons (e.g. to participate to a family event or before regular visits to family members, for your own comfort, to monitor if you are infected asymptomatic, etc.), and not because of symptoms or because you are a case contact?
Statements (same answers):

-free test
-1-2 euros
-2-5 euros
-more than 5 euros

Answers:

-more than once per week
-once per week
-every two weeks
-once per month
-less than once per month
-never

-I don’t know

Q11a) In the next fall/winter, in PRESENCE of recommendations by authorities to do so, do you plan to get tested against COVID-19 if you have respiratory symptoms?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q11b) In the next fall/winter, in ABSENCE of recommendations by authorities to do so,
do you plan to get tested against COVID-19 if you have respiratory symptoms?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q12)
In the next fall/winter, if you have respiratory symptoms and decide to get tested against COVID-19, you get tested:
-with a home swab, but only if it is free of charge
-with a home swab, but only if it costs less than 5 euros
-with a home swab, whatever the price
-with an antigenic test, but only if it is free of charge
-with an antigenic test, but only if it costs less than 20 euros
-with an antigenic test, whatever the price
-with a PCR test, but only if it is free of charge
-with a PCR test, but only if it costs less than 50 euros
-with a PCR test, whatever the price

Q13)
In the next fall/winter, if you have respiratory symptoms and decide to get tested against COVID-19, you test:
-as soon as possible, i.e. within 24 hours from the beginning of symptoms
-the next day or afterwards
-I don’t know

Q14)
In the next fall/winter, if you have respiratory symptoms, decide to get tested against COVID-19, and your test results negative, will you test again?
-yes, a second time if symptoms persist
-yes, at least three times if also my successive tests result negative but symptoms persist
-no
-I don’t know

Q15)

In the next fall/winter, if you have respiratory symptoms, decide to get tested against COVID-19, and your test(s) results are (all) negative, would you like to access to a test to detect influenza infection?
Statements (same answers):
-if access was immediate and free of charge
-if access was immediate and costed less than 5 euros
-if access was immediate and costed more than 5 euros
-if access was free of charge but not immediate (e.g. consulting the GP)
Answers:
-yes
-no
-I don't know

Q16a) In the next fall/winter and in case of a winter wave of COVID-19, in PRESENCE of recommendations by authorities to do so, do you plan to get tested if you are identified as case contact and do not show respiratory symptoms?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q16b) In the next fall/winter and in case of a winter wave of COVID-19, in ABSENCE of recommendations by authorities to do so, do you plan to get tested if you are identified as case contact and do not show respiratory symptoms?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q17)
In the next fall/winter and in case of a winter wave of COVID-19, if you are identified as case contact, do not show respiratory symptoms and decide to get tested against COVID-19, you get tested:
-with a home swab, but only if it is free of charge
-with a home swab, but only if it costs less than 5 euros
-with a home swab, whatever the price
-with an antigenic test, but only if it is free of charge
-with an antigenic test, but only if it costs less than 20 euros
-with an antigenic test, whatever the price
-with a PCR test, but only if it is free of charge
-with a PCR test, but only if it costs less than 50 euros
with a PCR test, whatever the price

SECTION 7 – ISOLATION NEXT FALL FOLLOWING COVID-19 INFECTION
This first set of questions refers to a situation in which you test positive against COVID-19 and you show symptoms (SYMPTOMATIC infection).

Q18a) In the next fall/winter, in PRESENCE of recommendations by authorities to do so, do you plan to isolate yourself after testing positive against COVID-19 and being SYMPTOMATIC?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q18b) In the next fall/winter, in ABSENCE of recommendations by authorities to do so, do you plan to isolate yourself after testing positive against COVID-19 and being SYMPTOMATIC?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q19)
In the next fall/winter, if you test positive against COVID-19, are SYMPTOMATIC, and decide to isolate yourself, do you isolate:
[Single choice]
-as soon as possible, i.e. within 24 hours from the beginning of symptoms or from the test result
-the next day or afterwards
-I don't know

Q20)
In the next fall/winter, if you test positive against COVID-19, are SYMPTOMATIC, and isolate yourself, do you isolate:
Statements:
-for the prescribed duration, in presence of recommendations by authorities to do so
-for a time shorter than the prescribed duration, in presence of recommendations by authorities to do so
-as long as symptoms persist, in absence of recommendations by authorities to do so
Answers:
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q21)
In the next fall/winter, if you test positive against COVID-19, are SYMPTOMATIC, and isolate yourself, do you get tested to exit isolation:
Statements:
-in PRESENCE of recommendations by authorities to do so
-in ABSENCE of recommendations by authorities to do so
Answers:
-most likely
-more or less likely

-more or less unlikely
-most unlikely

This second set of questions refers to a situation in which you test positive against COVID-19 but you do not show symptoms (ASYMPTOMATIC infection).

Q22a) In the next fall/winter, in PRESENCE of recommendations by authorities to do so, do you plan to isolate yourself after testing positive against COVID-19 and being ASYMPTOMATIC?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q22b) In the next fall/winter, in ABSENCE of recommendations by authorities to do so, do you plan to isolate yourself after testing positive against COVID-19 and being ASYMPTOMATIC?
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q23)
In the next fall/winter, if you test positive against COVID-19, are ASYMPTOMATIC, and decide to isolate yourself, do you isolate:
-as soon as possible, i.e. on the day of the test result
-the next day or afterwards
-I don't know

Q24)
In the next fall/winter, if you test positive against COVID-19, are ASYMPTOMATIC, and isolate yourself, do you isolate:
-for the prescribed duration, in presence of recommendations by authorities to do so
-for a time shorter than the prescribed duration, in presence of recommendations by authorities to do so
Answers:
-most likely
-more or less likely
-more or less unlikely
-most unlikely

Q25)
In the next fall/winter, if you test positive against COVID-19, are ASYMPTOMATIC, and isolate yourself, do you get tested to exit isolation:
Statements:
-in PRESENCE of recommendations by authorities to do so
-in ABSENCE of recommendations by authorities to do so

Answers:
-most likely
-more or less likely
-more or less unlikely
-most unlikely

2. Branching process model

a. Parameters of the model

The parameters of the model and their values are listed in **Table S2**.

Responses from survey participants were used to parameterize the model on the behavioral aspects (e.g. probability to getting tested, entering isolation, etc.). Here we provide more details on the responses that needed recoding or additional assumptions to be integrated in the modeling framework.

The mean delay to isolation was informed by participant's answers to Question 13 of the InfluenzaNet survey. We considered that respondents who answered "as soon as possible, i.e. within 24 hours from the beginning of symptoms" isolate with a delay of 1 day, while participants who answered "the next day or afterwards" had a 2 days onset-to-isolation delay. Our estimate of the mean declared onset-to-isolation delay was the average of these discrete delays of 1 and 2 days across survey respondents.

Adherence to the prescribed duration of isolation was informed by respondent's answers to the subquestion of Question 20 concerning isolation "for the prescribed duration, in presence of recommendations by authorities to do so". We considered together the percentage of respondents who answered "most likely" or "more or less likely". We repeated the same procedure for asymptomatic individuals using responses to Question 24 of the InfluenzaNet survey.

Adherence to testing and to isolation if recommended were informed by the responses of participants to questions Q11a, Q16a, Q18a and Q22a (**Table S2**). Also in this case, we considered together the percentage of respondents who answered "most likely" and "more or less likely" to these questions.

Table S2. Parameters used in the model.

Description	Value	Source
Infection progression		
Distribution of the number of secondary cases	(Negative binomial) Mean = Explored to achieve a given value of the reproductive number R Dispersion = 0.23	(4)
Generation time distribution	(Gamma) Mean = 6.9 days Standard deviation = 4.5 days	(5)
Incubation period distribution	(Gamma)	(5)

Description	Value	Source
	Mean = 3.5 days Standard deviation = 1.2 days	
Probability of being asymptomatic (when unvaccinated)	0.42	(6)
Relative infectiousness of asymptomatic compared to symptomatic individuals (%)	55%	(7)
Testing		
Percentage of individuals testing, if recommended	If symptomatic: 92.7% (France), 91.2% (Belgium), 97.3% (Italy) If asymptomatic: 78.2% (France), 82.3% (Belgium), 89.6% (Italy)	*InfluenzaNet survey (Q11a, Q.16a)*
Percentage of individuals testing, if recommended and if test cost is <20E	If symptomatic: 45.5% (France), 51.7% (Belgium), 74.6% (Italy) If asymptomatic: 42.0% (France), 46.6% (Belgium), 77.2% (Italy)	*InfluenzaNet survey (Q12, Q17)*
Delay from test sampling to test result	0.01 days	*Assumed*
Percentage of individuals testing twice, if negative and symptomatic	50.9% (France), 56.7% (Belgium), 68.2% (Italy)	*InfluenzaNet survey (Q14)*
Percentage of individuals testing more than three times, if negative and symptomatic	5.8% (France), 12.2% (Belgium), 15.7% (Italy)	*InfluenzaNet survey (Q14)*
Maximum number of daily tests, if negative and symptomatic	4	*Assumed*
Tracing		
Percentage of contacts of a positive individual that are traced	5%	*Assumed*

Description	Value	Source
Isolation		
Isolation effectiveness (%)	75% (60% and 90% for sensitivity)	Similar to (8)
Percentage of individuals isolating, if recommended	If symptomatic: 96.3% (if vaccinated), 78.0% (if unvaccinated) (France), 95.0% (if vaccinated), 76.9%* (if unvaccinated) (Belgium), 96.7% (if vaccinated), 78.3%* (if unvaccinated) (Italy) If asymptomatic: 88.5% (if vaccinated), 72.3% (if unvaccinated) (France), 93.6% (if vaccinated), 76.5%* (if unvaccinated) (Belgium), 97.2% (if vaccinated), 79.4%* (if unvaccinated) (Italy)	*InfluenzaNet survey (Q18a, Q22a)*
Distribution of delays to isolation	(Exponential) Mean = 1.1 days (France, Belgium, Italy)	*InfluenzaNet survey (Q13)*
Distribution of anticipated exit from isolation	(Exponential) Mean = ¾ prescribed duration of isolation	*Assumed (InfluenzaNet survey is used to determine the fraction of individuals who are subject to anticipated exit from isolation - see last section of this table)*
Percentage of individuals isolating for the prescribed duration	If symptomatic: 98.3% (France), 99.2% (Belgium), 97.9% (Italy) If asymptomatic: 97.9% (France), 98.4% (Belgium), 99.1% (Italy)	*InfluenzaNet survey (Q20, Q24)*

*since the unvaccinated populations in Belgium and Italy are not sufficiently represented in the survey, we assume the same relative variation of the behaviours of vaccinated and unvaccinated individuals reported in France.

b. Calibration of the reproductive number

Since the emergence of the Omicron variant of SARS-CoV-2 in December 2021, different waves of infection have occurred in the three countries, with time-varying reproductive number Rt shown in **Figure S1** below. The peak values of Rt were in the following ranges: 1.3-1.6 in France, 1.1-1.6 in Belgium, 1.3-2 in Italy (9). Based on this, in the main analysis we fixed the effective reproductive number R to 1.6, and explored a range of values between 1.3 and 2.1 for sensitivity.

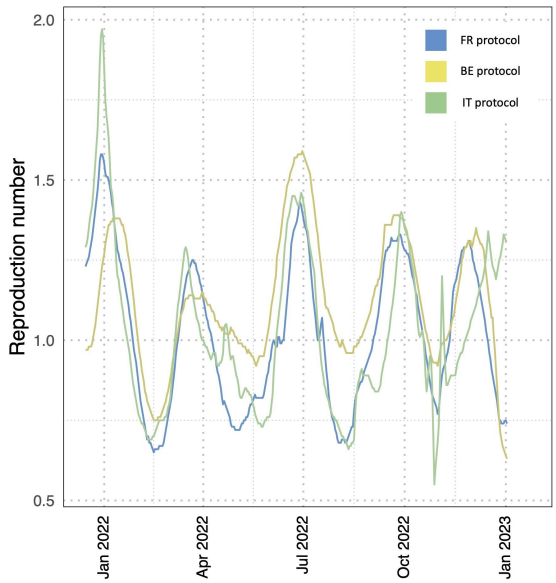

Figure S1. Time-varying reproductive number since mid-December 2021, in France, Belgium and Italy (9).

c. Testing and isolation

Figure S2 provides a few key examples of testing and isolation events in a branching process generated by person A. The figure follows the French protocol.

Person B is an example of a symptomatic and traced vaccinated infectee, who gets tested, resulting positive and therefore isolates. Person B exits isolation after a shorter isolation period compared to person A, since person B tests negative while person A tests positive to the exit test. Person C is an example of a symptomatic and traced unvaccinated infectee who gets tested, tests positive and isolates but not as a consequence of symptoms, rather as a consequence of tracing. Person C exits isolation after testing negative to an exit test. Person D is an asymptomatic vaccinated infectee who tests negative to an entry test performed as a consequence of being traced by person A. Testing negative to the entry test, person D never isolates. Person E is a symptomatic missed unvaccinated

secondary case of person A who tests and isolates. Person E's isolation period is long enough to cover the infectious period of person E until full recovery. Person F is an asymptomatic unvaccinated secondary case of person A, infected during person A's imperfect isolation period. As a consequence of being infected during the isolation period of person A, person F is not traced. Person F will therefore not isolate. Finally person G is a potential secondary case of person A that is saved from actual infection by the isolation of person A.

For individuals who are both symptomatic and traced we do not consider an increased probability of isolation on the second invitation to do so. Moreover, if an individual adheres to the first mandate to isolate, but tests negative, we do not consider it will test again after receiving the second solicitation to isolate.

It is possible however that individuals who are negative but symptomatic will get tested multiple times, as a consequence of awareness of imperfect test sensitivity. We assume that a share of individuals, informed by the responses to the InfluenzaNet survey, will get tested a second time, the day after. We assume then that with a lower probability, informed too by the responses to the InfluenzaNet survey, they will get tested daily, for up to 4 days, conditioned on the fact that a test was performed the day before and that it was negative. Individuals isolate with their individual adherence probability if they test positive to any of these tests.

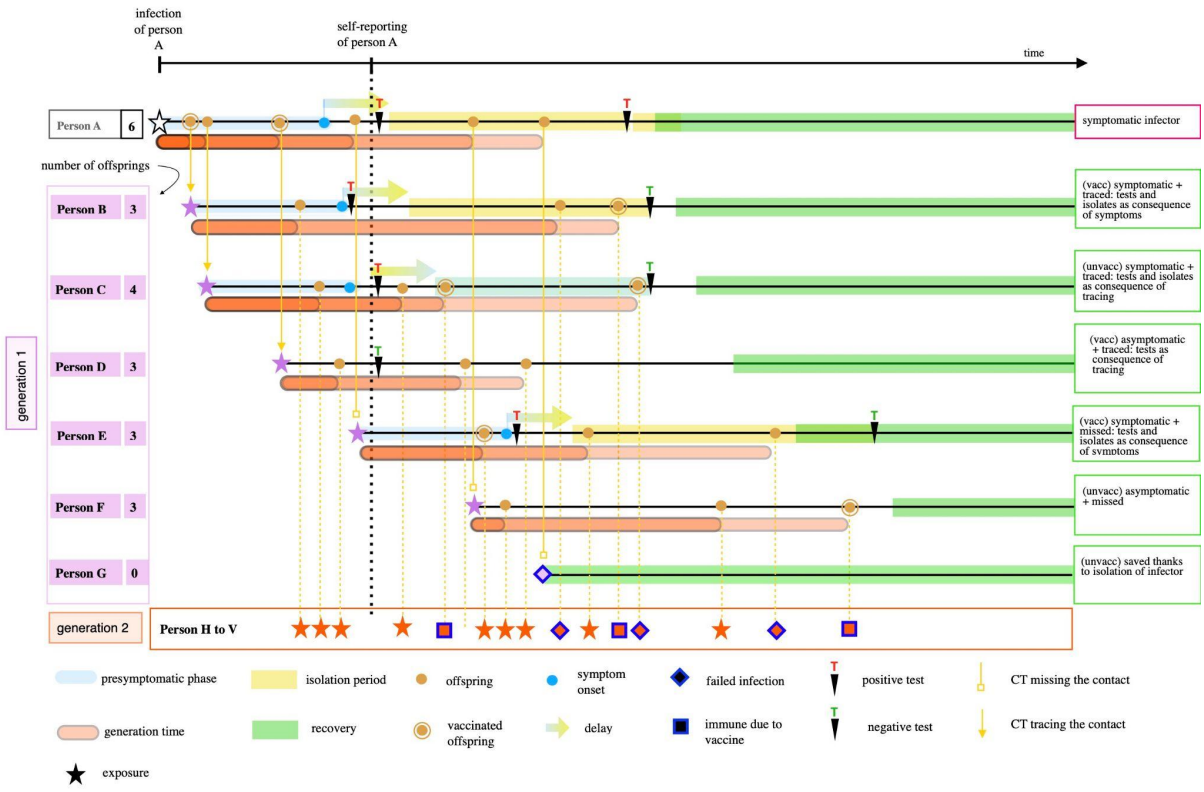

Figure S2. Branching process model. Schematic examples of propagation of infection from person A in the simulations. Infectees follow different paths of testing and isolation, based on their vaccination status, symptom status, time of infection compared to the isolation of infector A and individual adherence to testing and to isolation.

d. Vaccine-induced immunity profile of the population

To infer the population-level vaccine-induced immunity, we consider vaccination coverage data in each country and the waning of vaccine effectiveness against symptomatic infection. In particular, we discretize the waning process as follows (8,10): 2 vaccine doses at 1-6 months since the second dose, at 7-9 months, and at 10+ months; 3 vaccine doses at 1-3 months since the third dose, 4-6 months, or 7+ months; 4 vaccine doses within 3 months from the fourth dose.
We used national datasets (10–12) of the daily reported number of administered vaccine doses, stratified by ordinal numbers of doses, to determine the percentage of the vaccinated population in each waning category by Sept. 1, 2022 (**Figure S3**). In order to estimate the periods of last administration of vaccine doses from these data we assumed priority to additional doses was given to older vaccine doses.

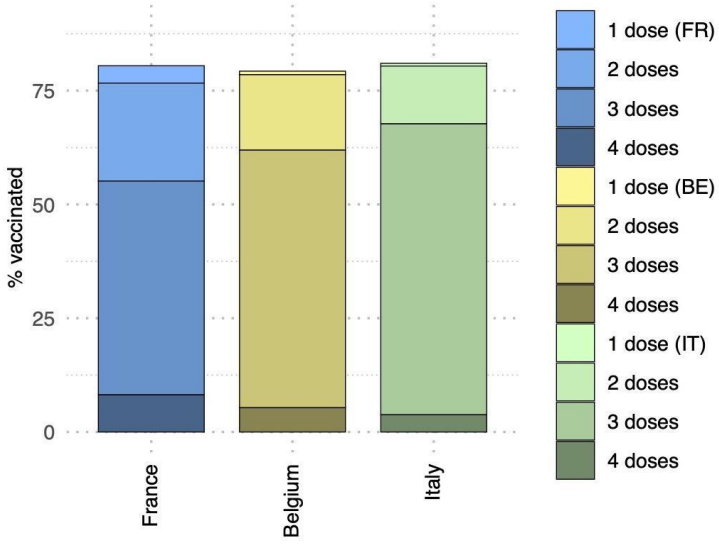

Figure S3. Vaccination coverage by dose in France, Belgium, Italy by September 1, 2022.

We then considered that the change from Sept 1, 2022 vaccine-induced immunity profile to the profile at the start of the 2022/2023 winter is due to two factors. First, the waning of vaccine-conferred immunity throughout this period. Second, the uptake of the fall 2022 booster campaign; here we assume that a share of vaccinated individuals with 3 doses will get the fall booster, according to survey respondents. We also consider that the probability of performing an additional booster dose is independent of the period of time in which the 3rd dose was administered. In our study we only considered the fall booster administered to seniors. Despite fall booster vaccination campaigns have recently been extended to the whole population, coverage in adults is negligible.

In order to determine the estimated vaccine-conferred protections against symptomatic infection in each waning group, we fitted the waning estimates of protection conferred by 2 and 3 doses of the Pfizer-BioNTech BNT162b2 vaccine against Omicron symptomatic infection (8) with a 2nd order polynomial and an exponential tail where data was missing. We assumed that vaccine-induced protection against symptomatic infection was the same for a fourth dose of vaccine as for a third dose, and that it underwent the same waning process with time. We assumed vaccine effectiveness against infection was 10% lower of the estimated vaccine effectiveness against symptomatic infection.

For waning categories associated with a vaccine protection greater than 6% we assumed a gaussian distribution of vaccine-conferred protection. For lower protection categories we assumed an exponential distribution of vaccine-conferred protection. The mean of the distributions are the protections estimated by averaging the fits of vaccine-induced protections over the waning period considered in the corresponding waning class. The standard deviation is such that approximately 100% of the data falls in the range of protections covered by the waning class.
For each vaccinated individual in the branching process we performed a Monte Carlo sampling of the vaccine-induced protection against symptomatic infection from the sum of the distributions of vaccine-induced protection in each waning class (see **Figure 2** of the main text).
Average vaccine-conferred protections in each waning period are listed in **Table S3**.
Vaccine-conferred protection against infection and symptomatic infection appear to be lower for a third dose compared to a second dose. Although after the first few months of waning of immunity, point estimates of Ref. (8) are higher for a third dose, third dose point estimates go to zero while second dose point estimates stabilize to finite low values, on the long run. This is likely due to the simultaneous study of various subvariants of Omicron in Ref. (8).

Table S3. Point-estimates of vaccine effectiveness against symptomatic infection in each waning category and vaccine effectiveness against transmission.

	2 doses			**3 doses**			**4 doses**		**Source**
Period of administration of last dose (months)	**14+**	**11-13**	**5-10**	**11+**	**8-10**	**5-7**	**5-7**	**1-4**	
VE against symptomatic infection	3.7%	7.0%	14.9%	0.0%	0.1%	12.9 %	12.9%	52.7%	(8)
VE against transmission	5%								(13)

e. Test sensitivity

We built a temporal diagnostic sensitivity for antigen tests based on estimated viral load and generations time distribution (5,14–16) to reproduce the observed sensitivity over time since symptoms onset for the Omicron variant reported in the literature (17,18) (see **Figure S4**).

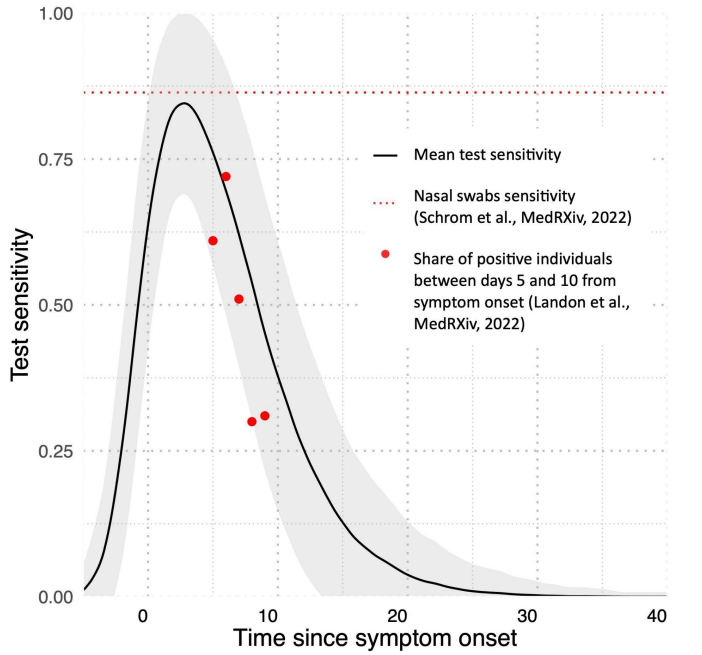

Figure S4. Test sensitivity. Mean test sensitivity and comparison to literature estimates of antigen test sensitivity for the Omicron variant (17,18).

3. Additional results

a. Mean isolation duration per detected case

Figure S5 compares the mean isolation duration per detected case across protocols, if implemented in France. The values of isolation duration are population averages and hence take into account behavioural delays and anticipated exits from isolation, informed by survey participants' responses. We find that the mean isolation durations of French and Belgian protocols are comparable, despite differences in exit test strategies and the presence or absence of vaccination-based isolation mandates. The Italian protocol yields significantly longer isolation durations.

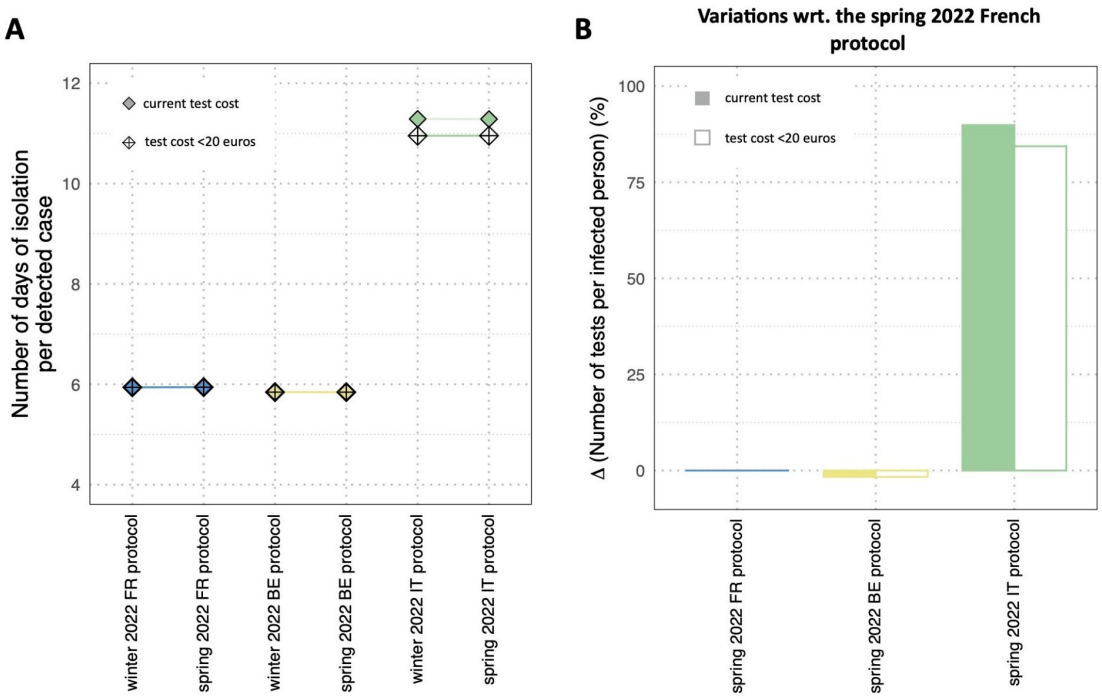

Figure S5. Mean isolation duration per detected case. Mean and 95% bootstrap confidence interval. a) Number of days of isolation per detected case in each protocol. b) Relative variation of the number of days of isolation per detected case compared to the spring 2022 French protocol. All results refer to the three protocols as if applied in France.

Because the mandates for entry in isolation are comparable across protocols, the percentages of pre-isolation transmission predicted by the model are also similar in all protocols, while longer isolation durations in the Italian protocol yield significantly lower post-isolation transmission compared to the French and Belgian protocols (**Figure S6**).

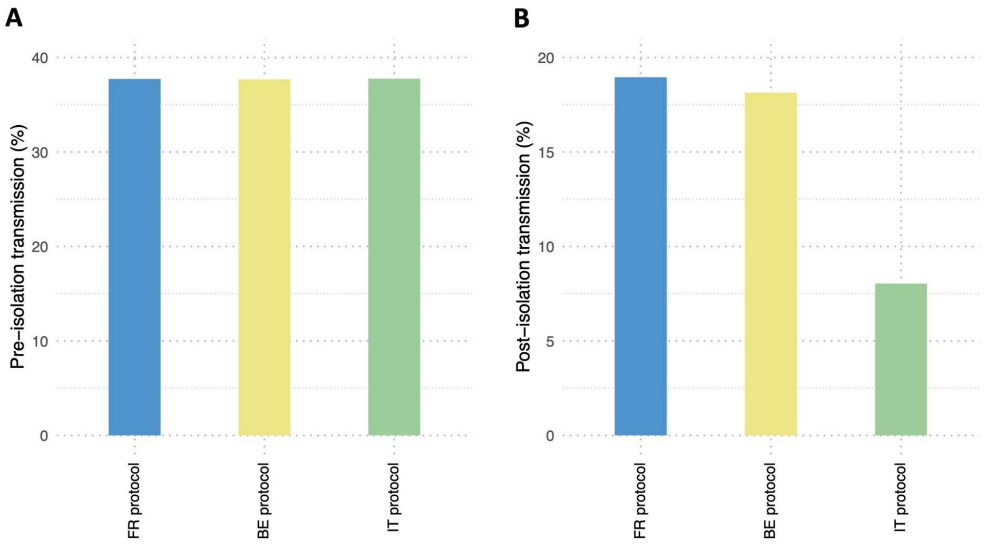

Figure S6. Pre- and post-isolation transmission in the spring protocols. a) Percentage of transmission occurring before entrance in isolation. b) Percentage of transmission occurring after exit from isolation.

b. Results for additional values of the effective reproductive number

Here we present the results obtained for the effective reproductive number R in the range 1.3-2.1. This may correspond to a context characterised, for example, by a higher or lower vaccination uptake in presence of the same circulating variant, with other conditions being equal (e.g. interventions, preventive behaviors, etc.). We find that the impact of protocols on the circulation of the pathogen is minimally affected by R (**Figure S7**), similarly to results of Ref. (19). A larger change is observed for Italian protocols when R=1.3 and under current test conditions cost since in this case R goes below the threshold (i.e. R<1) in some stochastic simulations (median R = 0.96).

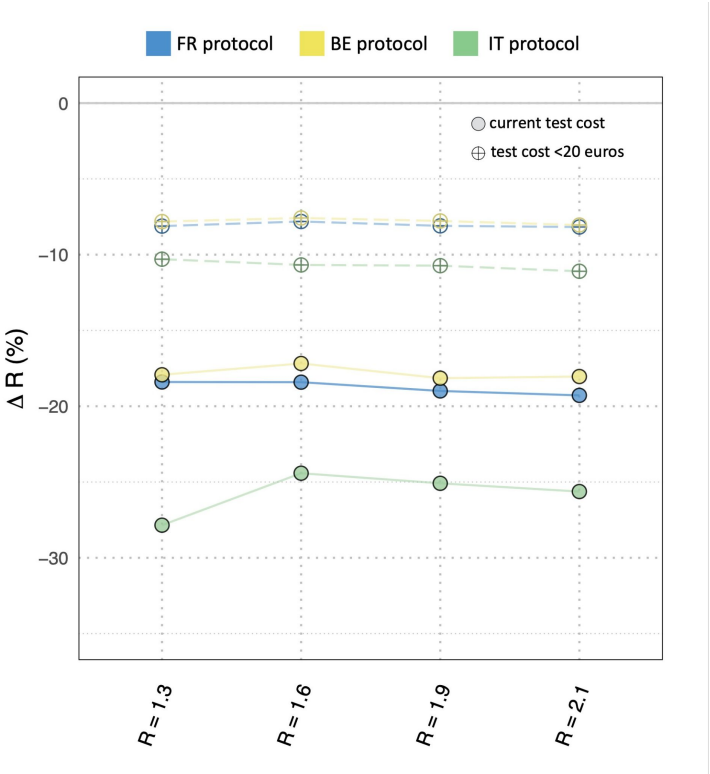

Figure S7. **Expected performance of the French, Belgian, and Italian protocols in the 2022/2023 winter for various median values of R (R=1.3, R=1.6, R=.19 and R=2.1).** Relative variation of the effective reproductive number compared to the no intervention case (absence of TI, testing and isolation) for the 2022 spring protocols of each country. Medians.

c. Results of each protocol applied to its own country

Here we present the performance of each protocol when applied to its corresponding country, i.e. accounting for the declared adherence to testing and isolation of the survey respondents of that country. In **Figure S8**, we consider a winter wave scenario characterised by R=1.6 in the three countries, as in the main text, i.e. effectively discounting the differences in population-level immunity profile across the three countries. Given that declared adherence is rather homogeneous across the countries, results are very similar to those presented in the main text. The only difference is due to the larger compliance to testing reported in Italy, in case tests were to cost up to 20 Euros (64% higher adherence to test in Italy compared to France), yielding a larger mitigation effect (19% relative reduction of R if the Italian protocol is implemented in Italy vs. 11% reduction if implemented in France). Clearly, this also impacts the average number of tests per infected person predicted in Italy if tests were to cost <20 Euros.

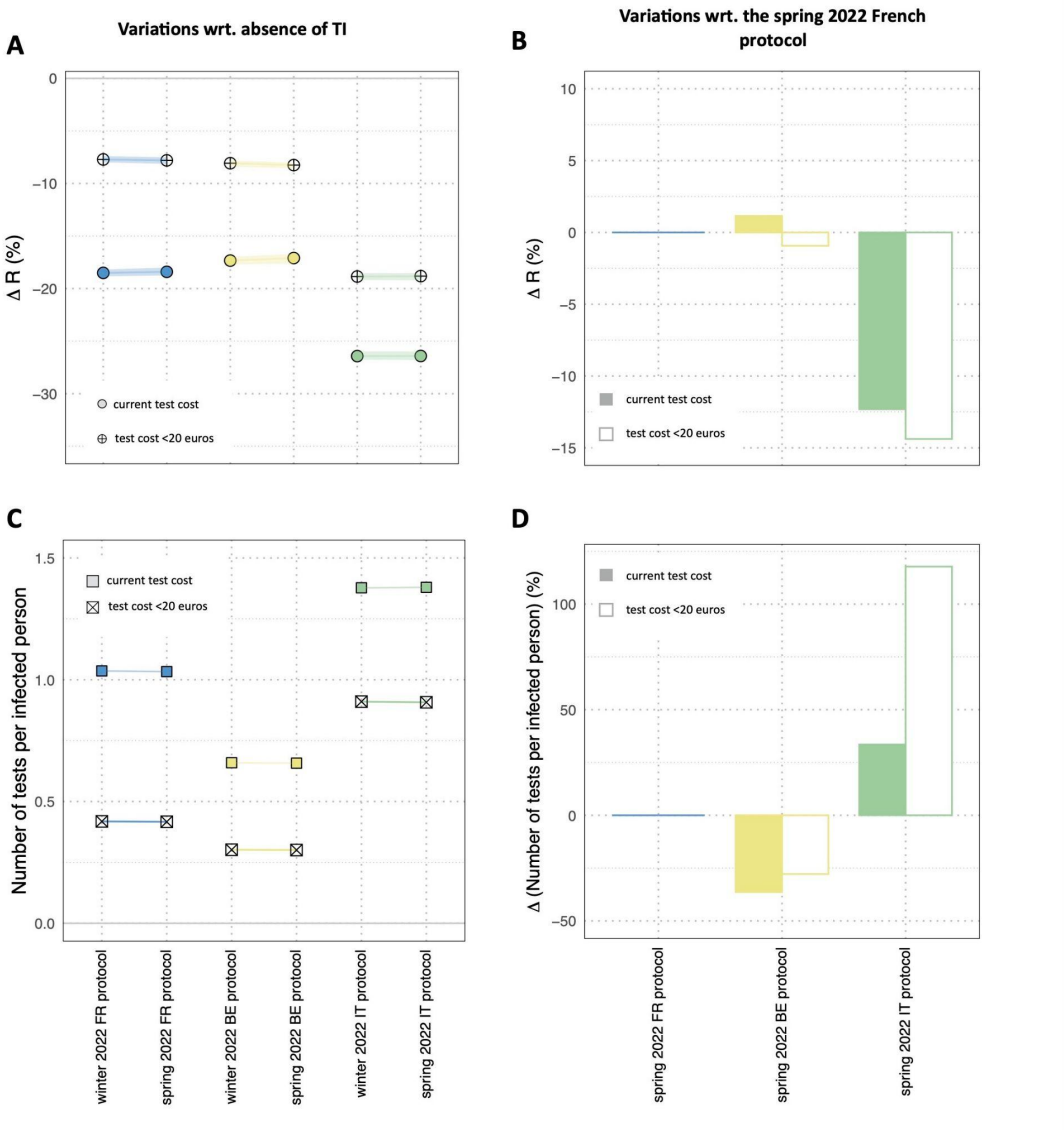

Figure S8. Expected performance of the French, Belgian, and Italian protocols in the 2022/2023 winter each applied in their own country. a) Relative variation of the effective reproductive number compared to the no intervention case (absence of TI, testing and isolation) for each protocol. Medians and 95% bootstrap confidence interval. b) Relative variation of the effective reproductive number compared to the spring 2022 French protocol (currently applied). Medians and 95% bootstrap confidence interval. c) Mean number of diagnostic tests per infected case. d) Mean relative variation of the number of diagnostic tests per infected case compared to the spring 2022 French protocol (currently applied).

d. Isolation effectiveness

Here we present the expected performances of the various protocols during a winter wave in France if isolation was characterized by higher or lower levels of effectiveness compared to the one discussed in the main text.

If we consider a 60% reduction of transmissibility of infected individuals while they are isolated, our model predicts a range of reduction of transmission in the community of 15-22% (**Figure S9**). If we

consider instead a 90% isolation effectiveness, our model predicts a range of reduction of R of 21-29% (**Figure S10**).

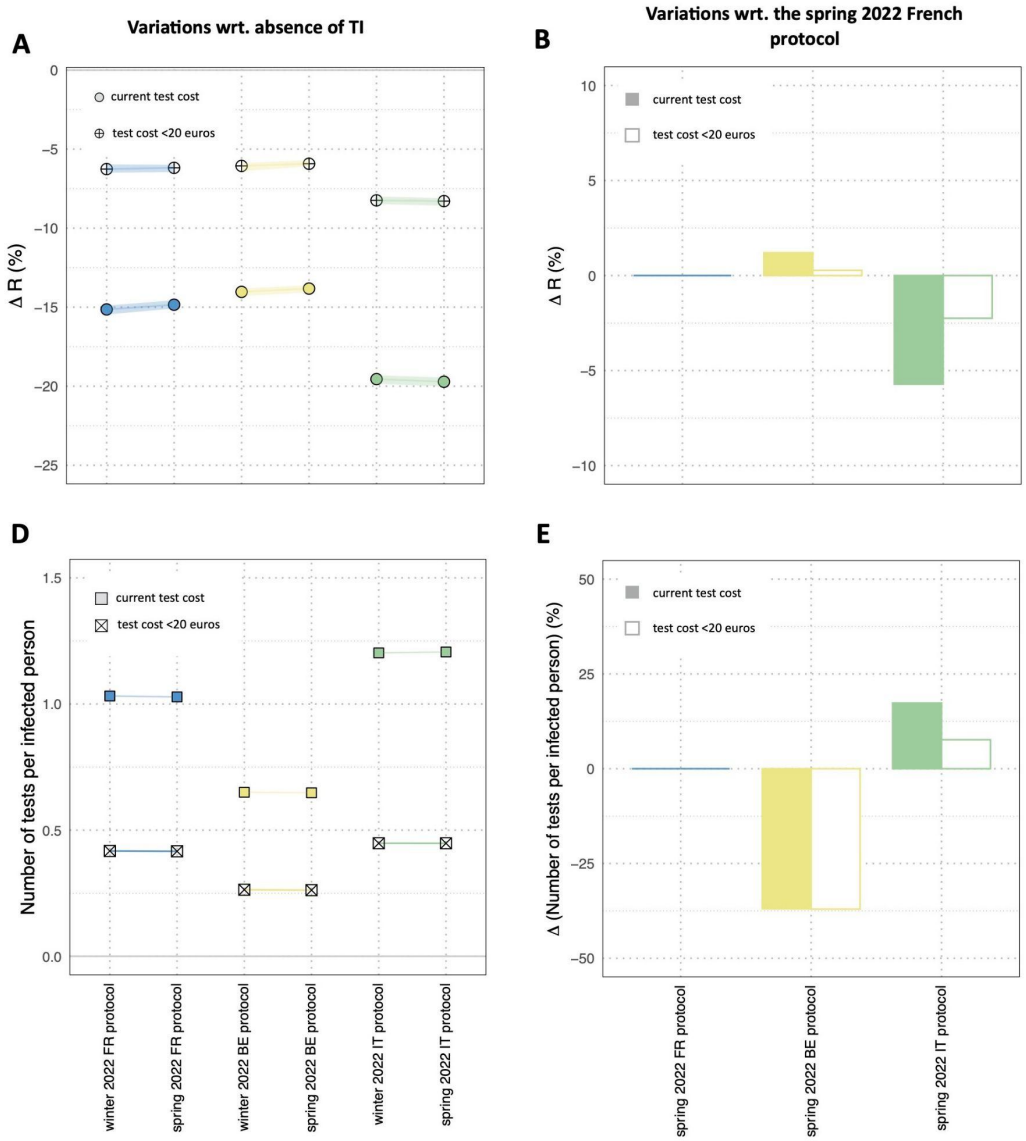

Figure S9. Expected performance of the French, Belgian and Italian protocols in France, next winter under 60% isolation effectiveness. a) Relative variation of the effective reproductive number compared to the no intervention case for each protocol. Median and 95% bootstrap confidence interval. b) Relative variation of the effective reproductive number compared to the spring 2022 French protocol. Median and 95% bootstrap confidence interval. c) Number of diagnostic tests per infected case. Mean and 95% bootstrap confidence interval. d) Relative variation of the number of diagnostic tests per infected case compared to the spring 2022 French protocol. Mean and 95% bootstrap confidence interval. All results refer to the three protocols as if applied in France.

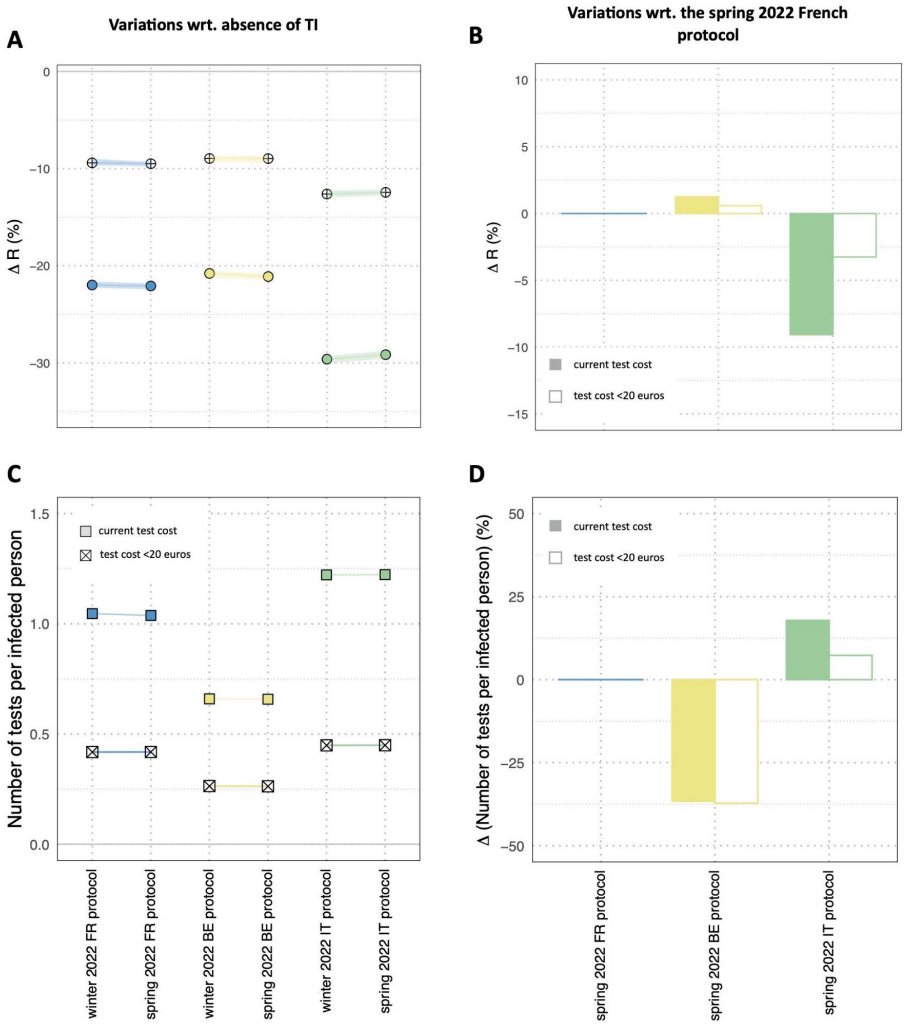

Figure S10. Expected performance of the French, Belgian and Italian protocols in France, next winter under 90% isolation effectiveness. a) Relative variation of the effective reproductive number compared to the no intervention case for each protocol. Median and 95% bootstrap confidence interval. b) Relative variation of the effective reproductive number compared to the spring 2022 French protocol. Median and 95% bootstrap confidence interval. c) Number of diagnostic tests per infected case. Mean and 95% bootstrap confidence interval. d) Relative variation of the number of diagnostic tests per infected case compared to the spring 2022 French protocol. Mean and 95% bootstrap confidence interval. All results refer to the three protocols as if applied in France.

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